OIPE
MAY 18 2004
PATENT & TRADEMARK OFFICE

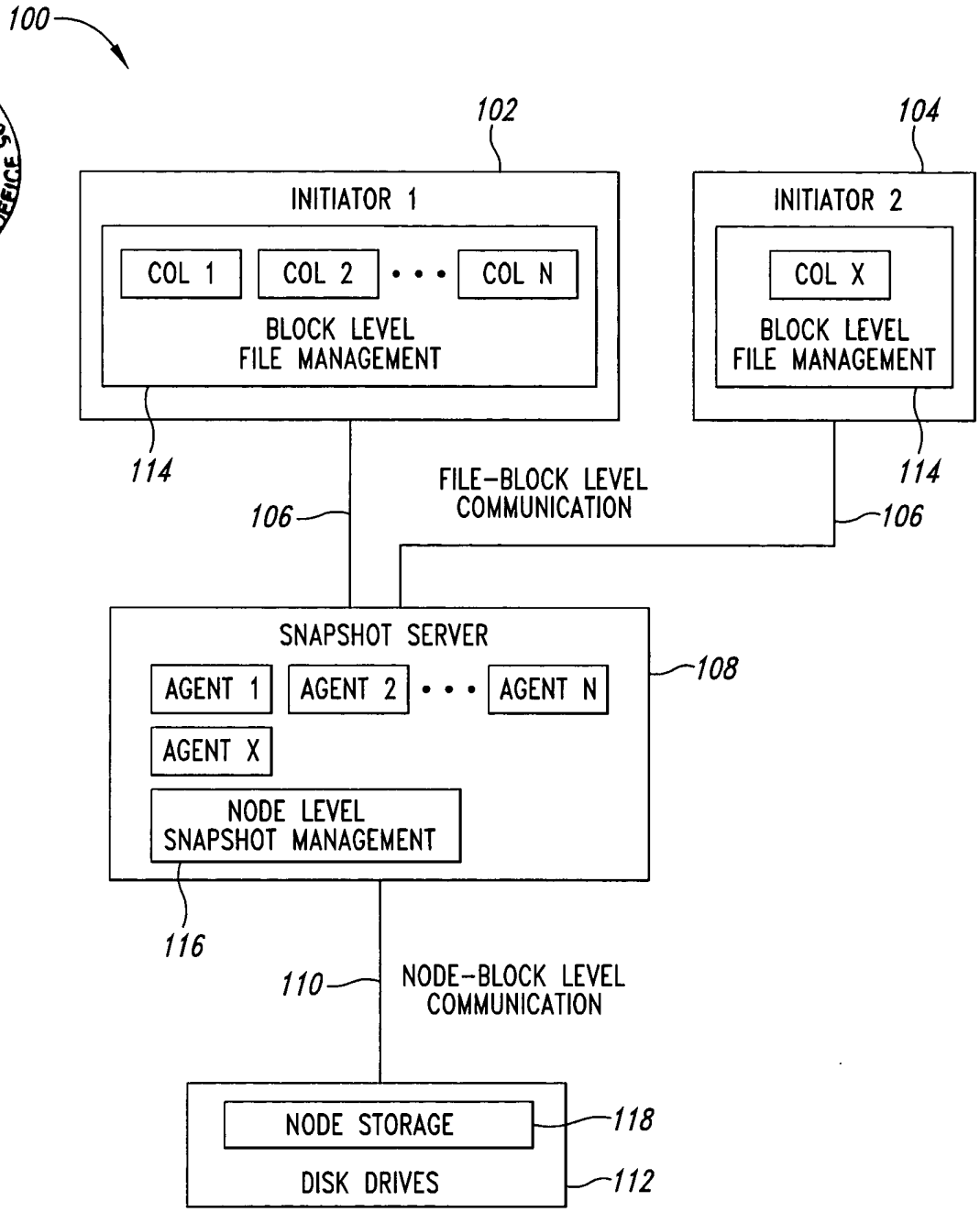

Fig. 1

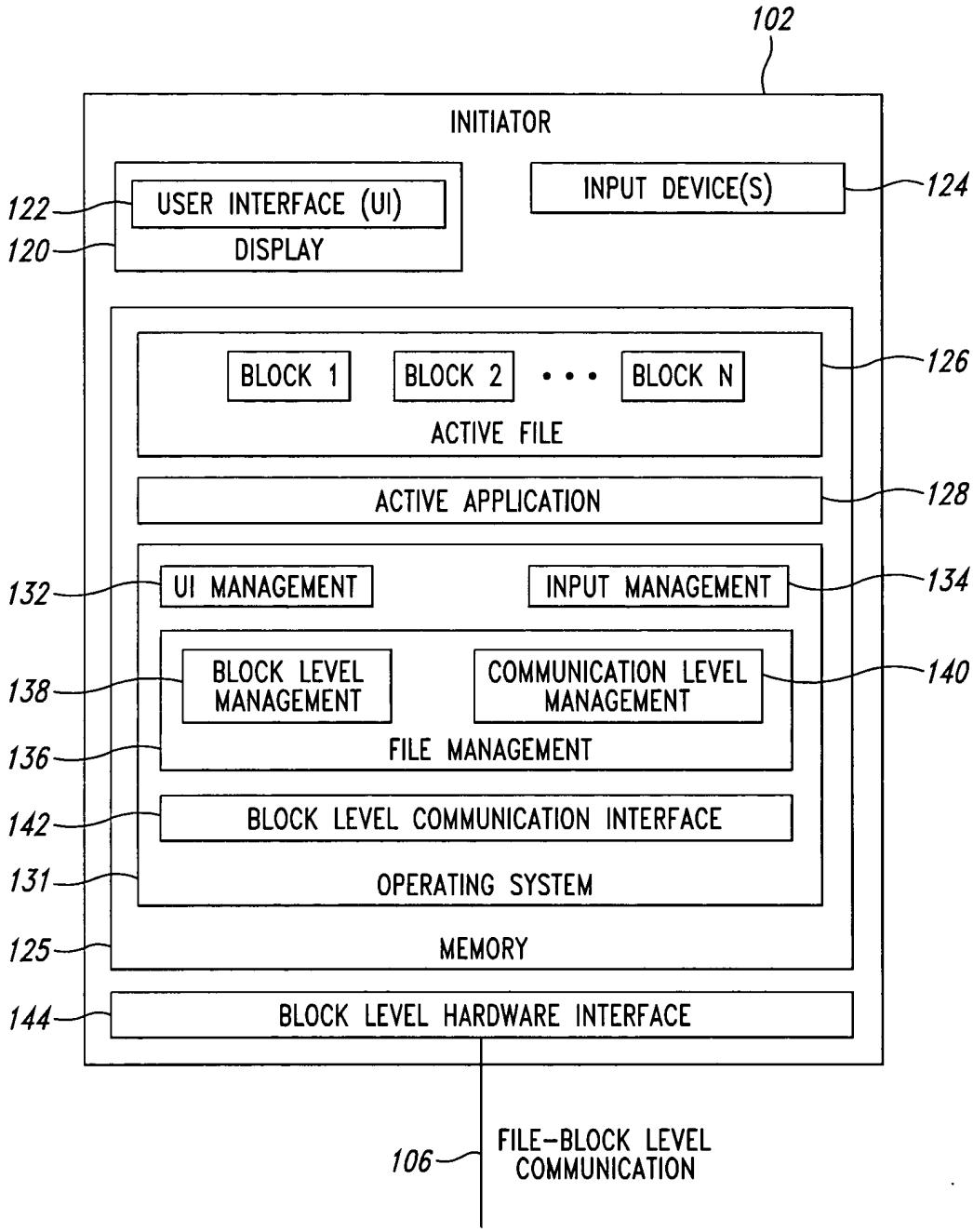
102
INITIATOR
USER INTERFACE (UI)
DISPLAY
INPUT DEVICE(S)
122
120
124
BLOCK 1
BLOCK 2
BLOCK N
ACTIVE FILE
126
ACTIVE APPLICATION
128
UI MANAGEMENT
INPUT MANAGEMENT
132
134
BLOCK LEVEL MANAGEMENT
COMMUNICATION LEVEL MANAGEMENT
FILE MANAGEMENT
138
140
136
BLOCK LEVEL COMMUNICATION INTERFACE
142
OPERATING SYSTEM
131
MEMORY
125
BLOCK LEVEL HARDWARE INTERFACE
144
FILE-BLOCK LEVEL COMMUNICATION
106

Fig. 2

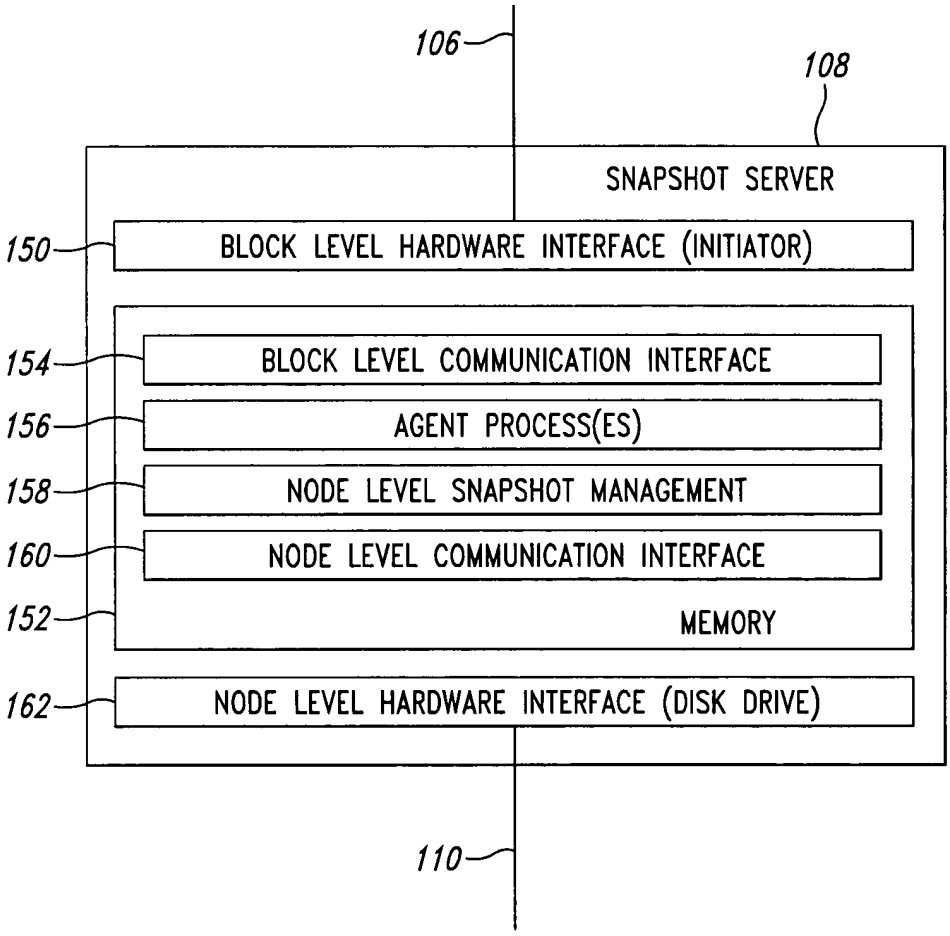
106
108
SNAPSHOT SERVER
150
BLOCK LEVEL HARDWARE INTERFACE (INITIATOR)
154
BLOCK LEVEL COMMUNICATION INTERFACE
156
AGENT PROCESS(ES)
158
NODE LEVEL SNAPSHOT MANAGEMENT
160
NODE LEVEL COMMUNICATION INTERFACE
152
MEMORY
162
NODE LEVEL HARDWARE INTERFACE (DISK DRIVE)
110

Fig. 3

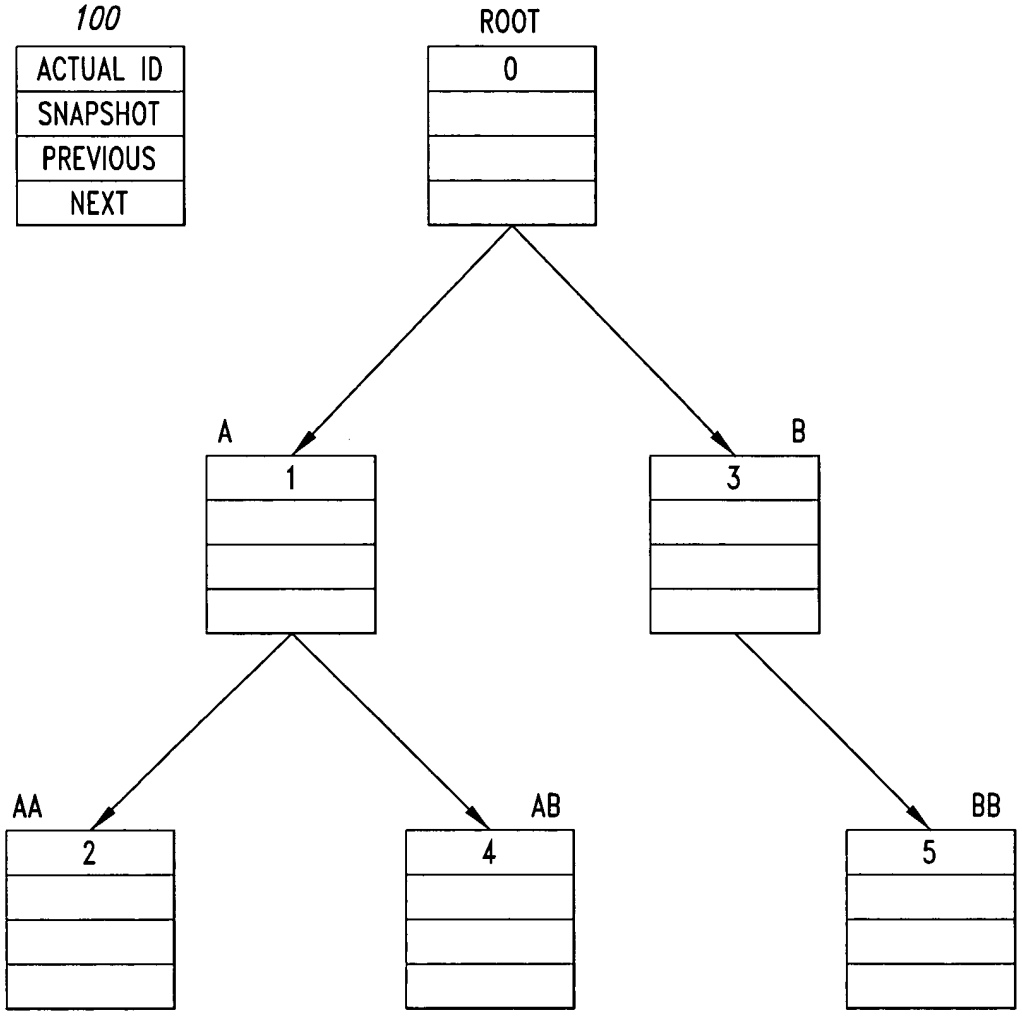

Fig. 4

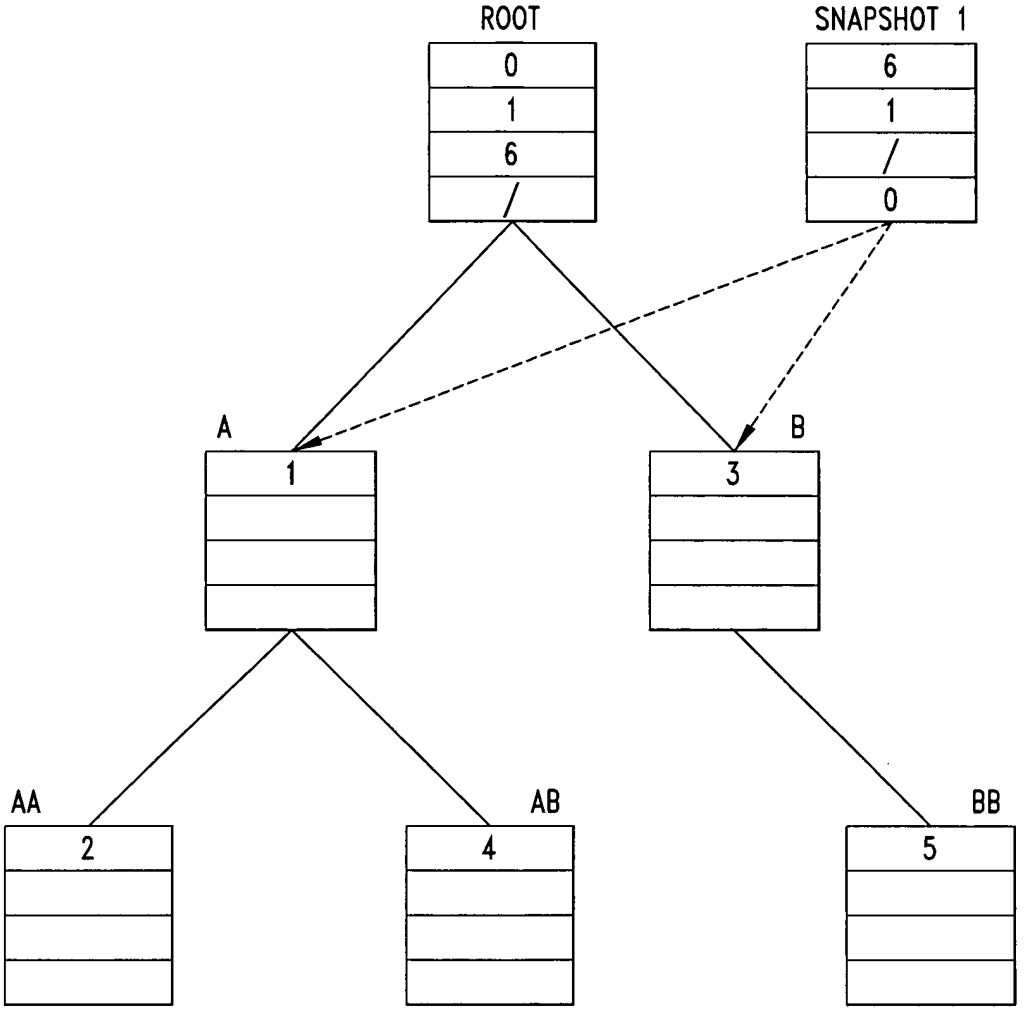

Fig. 5

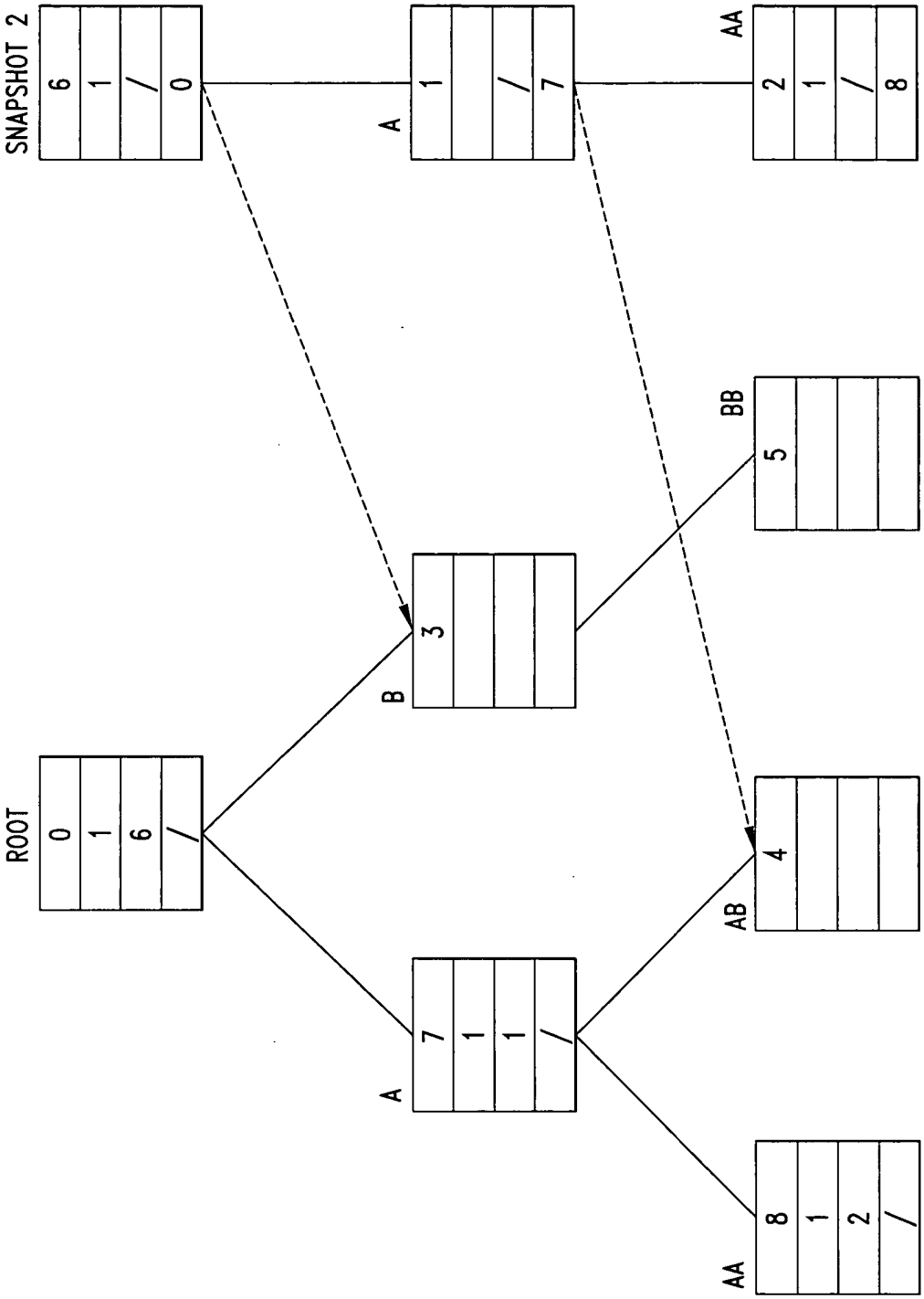

Fig. 6

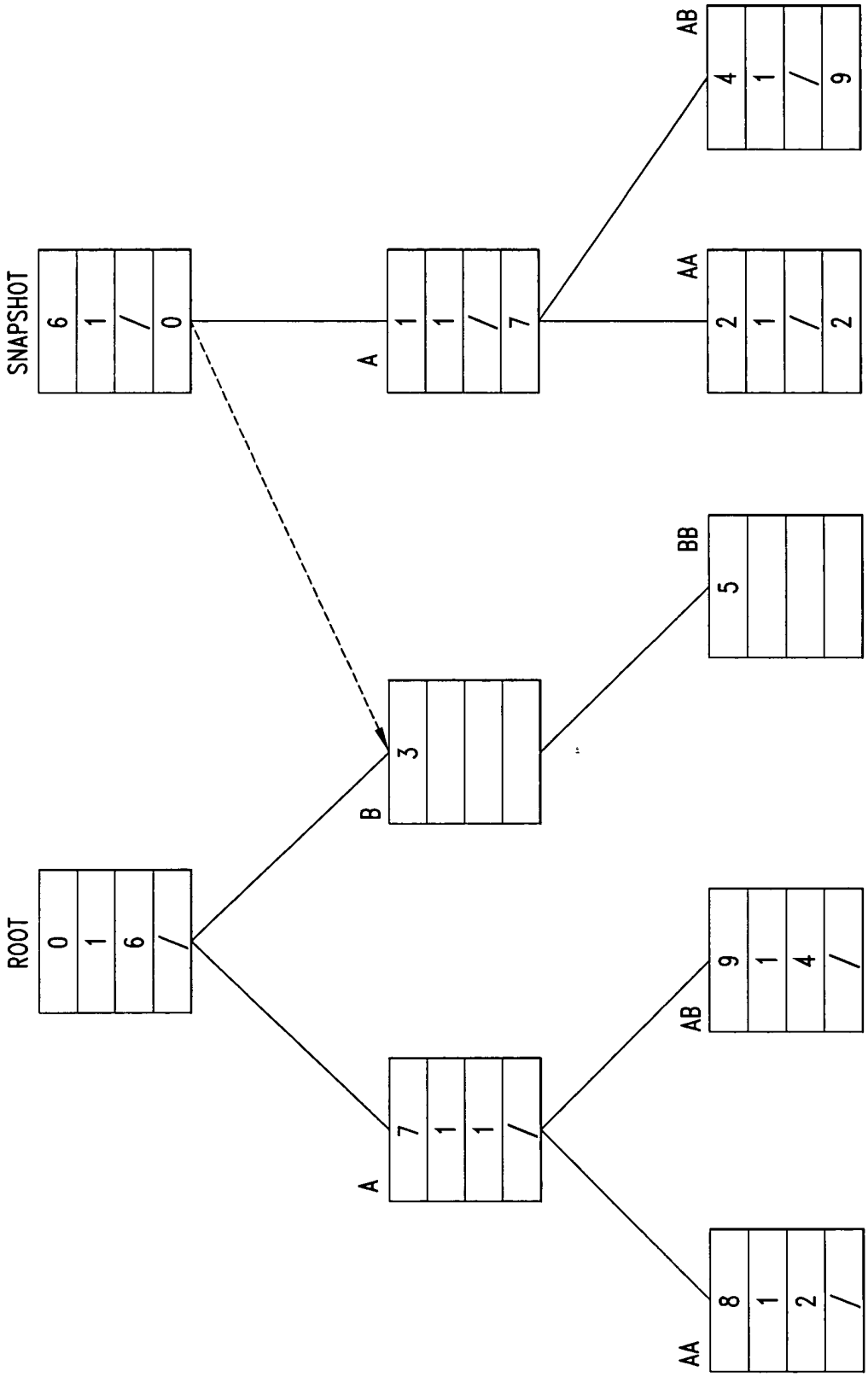
SNAPSHOT
6
1
/
0
A
1
1
/
7
AB
4
1
/
9
AA
2
1
/
2
BB
5
B
3
ROOT
0
1
6
/
A
7
1
1
/
AB
9
1
4
/
AA
8
1
2
/

Fig. 7

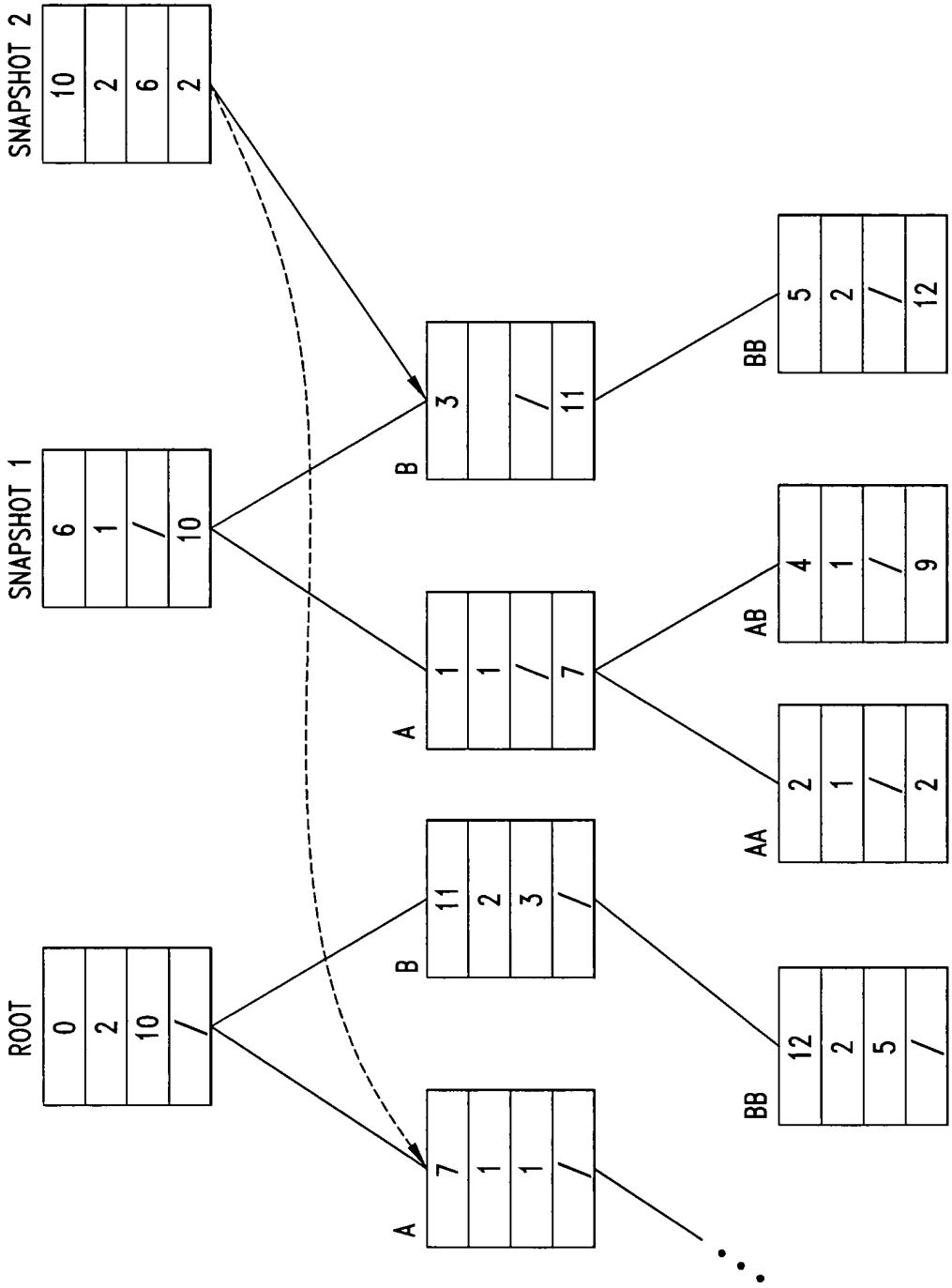
SNAPSHOT 2
10
2
6
2
SNAPSHOT 1
6
1
/
10
ROOT
0
2
10
/
B
3
/
11
A
1
1
/
7
B
11
2
3
/
A
7
1
1
/
BB
5
2
/
12
AB
4
1
/
9
AA
2
1
/
2
BB
12
2
5
/

Fig. 8

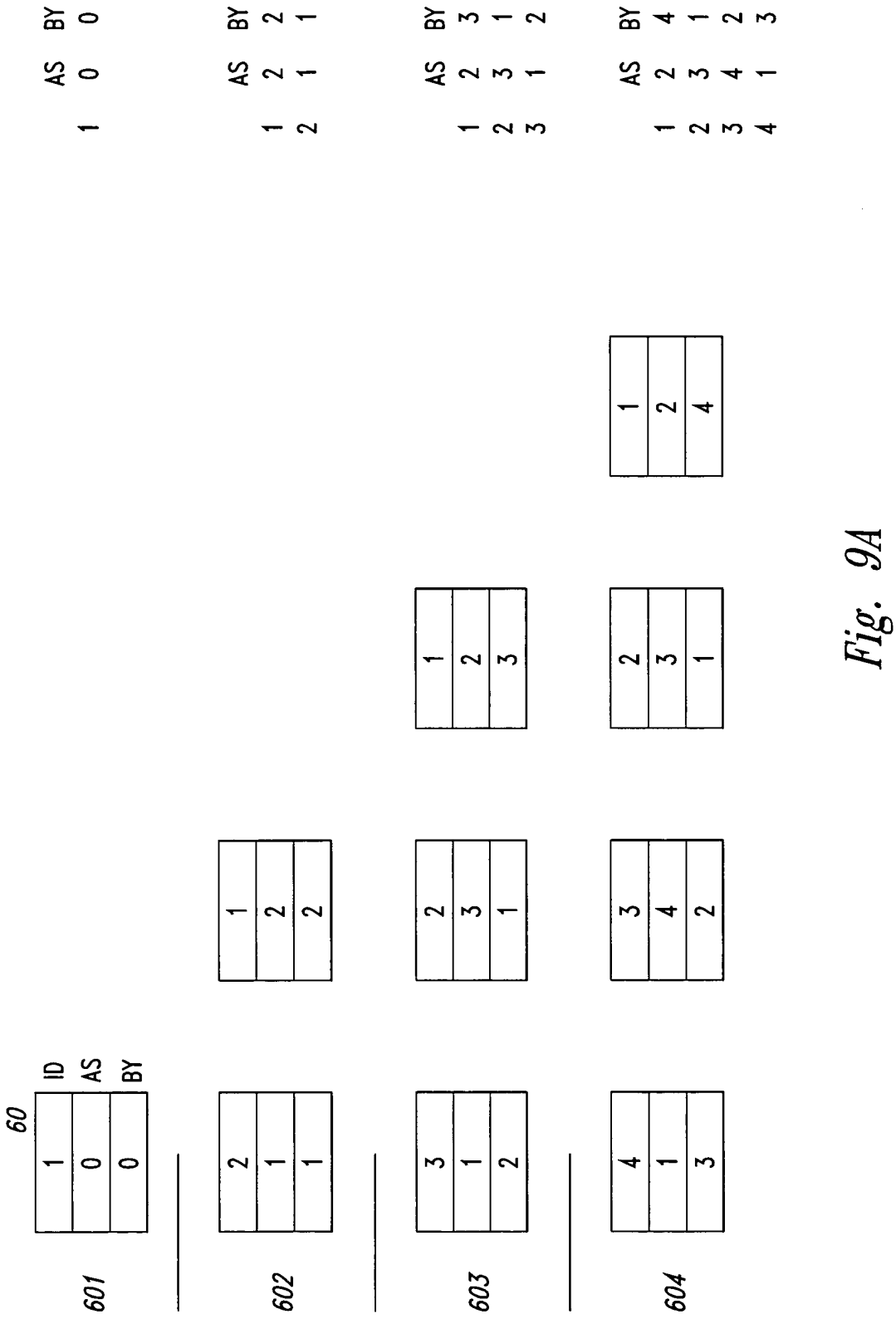
60
ID
AS
BY
1
0
0
2
1
1
3
1
2
4
1
3
601
602
603
604
AS BY
1 0
2 1
3 2
4 3
AS BY
1 2
2 1
3 1
4 2
AS BY
1 3
2 1
3 2
4 1
AS BY
1 4
2 1
3 2
4 3

Fig. 9A

	1	2	3	4
AS	2	3	4	1
BY	4	1	2	3

	1	2	3	4
AS	3	0	4	1
BY	4	0	1	3

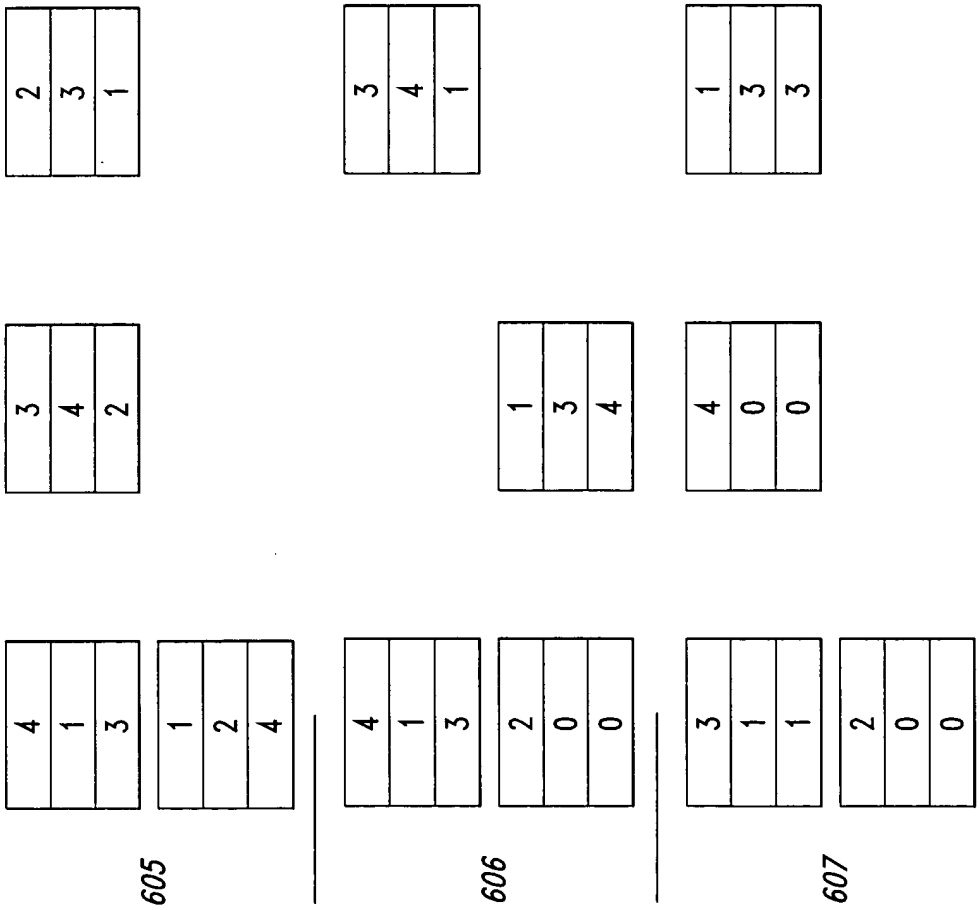

Fig. 9B

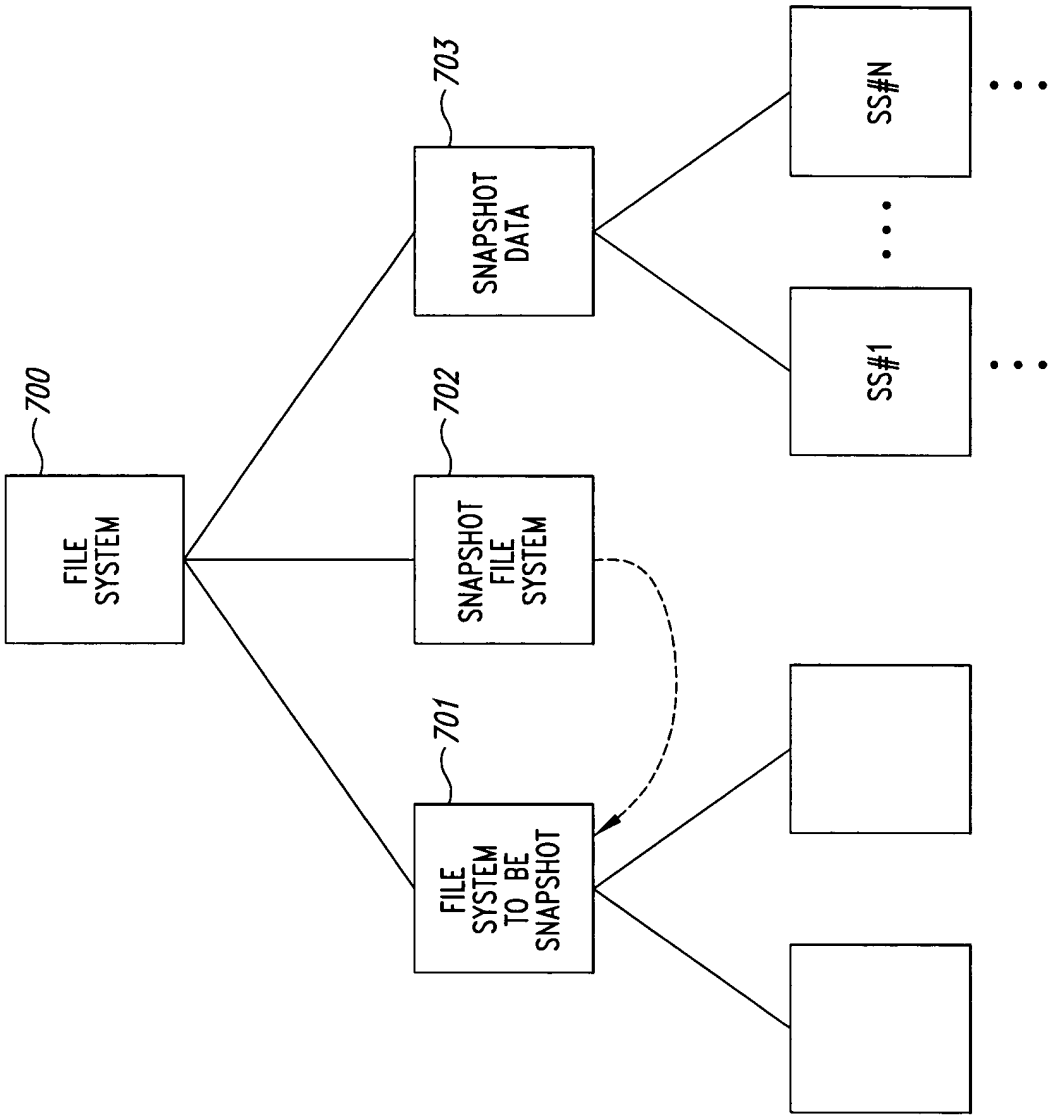
700
FILE SYSTEM
702
SNAPSHOT FILE SYSTEM
701
FILE SYSTEM TO BE SNAPSHOT
703
SNAPSHOT DATA
SS#1
SS#N

Fig. 10

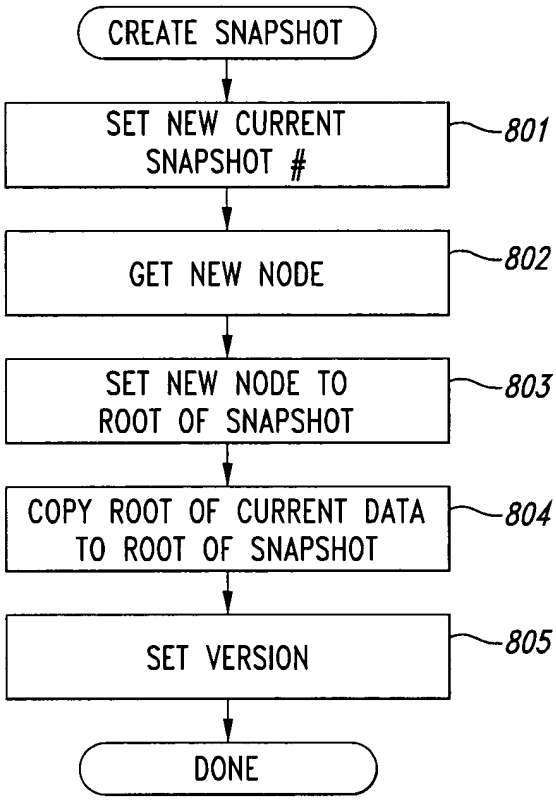
CREATE SNAPSHOT
SET NEW CURRENT SNAPSHOT #
801
GET NEW NODE
802
SET NEW NODE TO ROOT OF SNAPSHOT
803
COPY ROOT OF CURRENT DATA TO ROOT OF SNAPSHOT
804
SET VERSION
805
DONE

Fig. 11

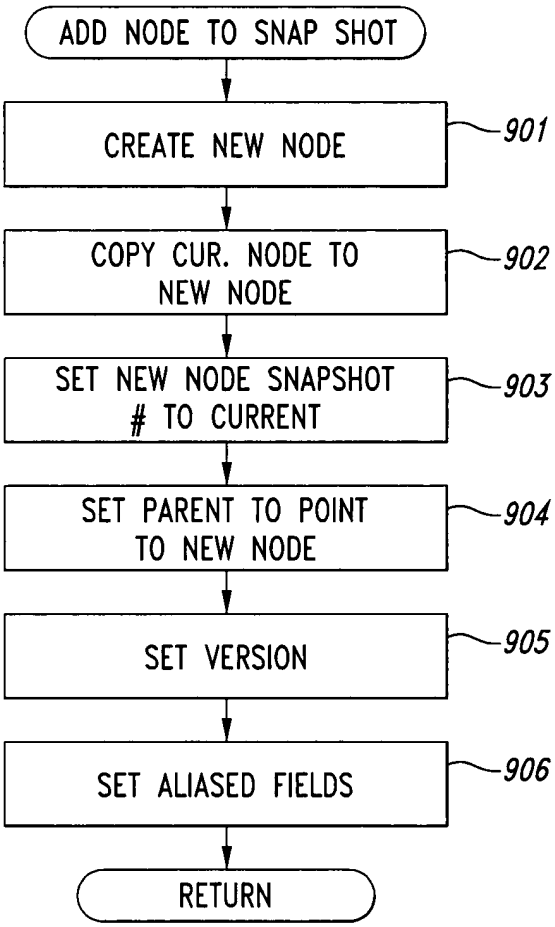
ADD NODE TO SNAP SHOT
CREATE NEW NODE
901
COPY CUR. NODE TO NEW NODE
902
SET NEW NODE SNAPSHOT # TO CURRENT
903
SET PARENT TO POINT TO NEW NODE
904
SET VERSION
905
SET ALIASED FIELDS
906
RETURN

Fig. 12

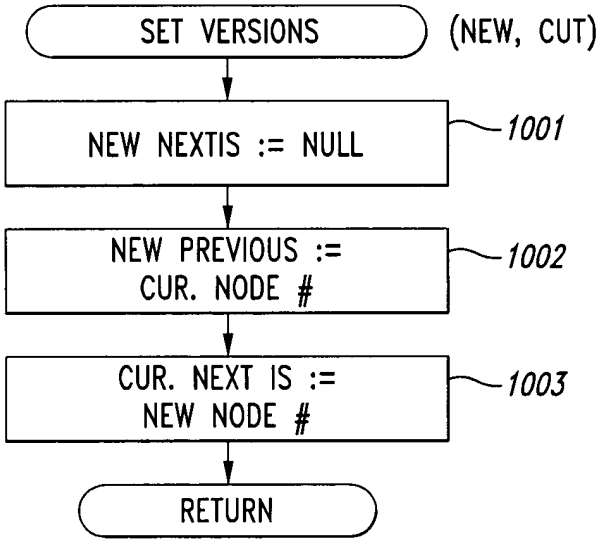
SET VERSIONS
(NEW, CUT)
NEW NEXTIS := NULL
1001
NEW PREVIOUS := CUR. NODE #
1002
CUR. NEXT IS := NEW NODE #
1003
RETURN

Fig. 13

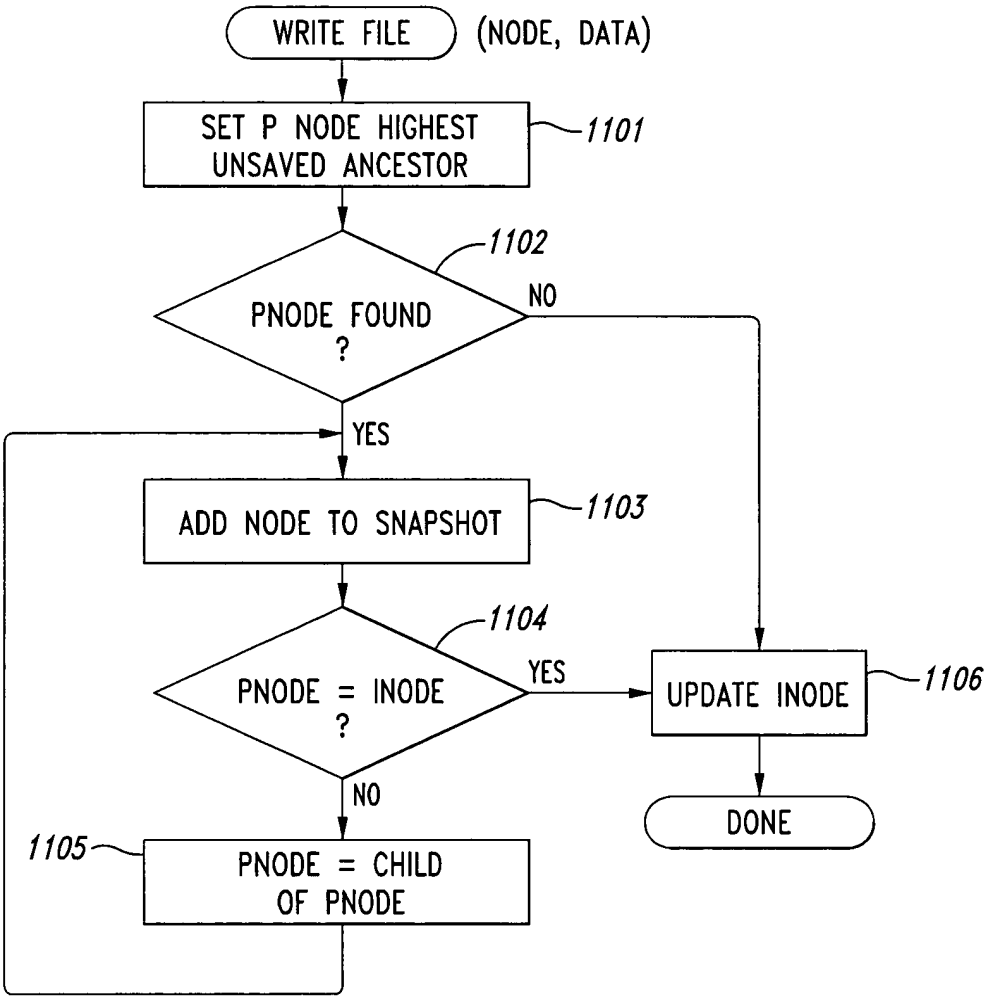
WRITE FILE
(NODE, DATA)
SET P NODE HIGHEST UNSAVED ANCESTOR
1101
1102
PNODE FOUND ?
NO
YES
ADD NODE TO SNAPSHOT
1103
1104
PNODE = INODE ?
YES
UPDATE INODE
1106
NO
DONE
1105
PNODE = CHILD OF PNODE

Fig. 14